IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: MORI et. al

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Examiner: Jeffrey L. Gellner (parent appln.)

Title: PLANT-CULTIVATING CONTAINER AND PLANT-CULTIVATING METHOD

DECLARATION UNDER RULE 132

Honorable Commissioner of Patent and Trademarks Washington, D.C. 20231

I, Akihiro OKAMOTO, declare and state that I graduated from Department of Applied Phisics, Faculty of Science and Engineering, Waseda University in march 1967 and obtained Master of Science. I have been employed by DENKI KAGAKU KOGYO KABUSHIKI KAISHA since April, 1967, during which time I have been engaged, among others, in the research and development in the field polymer synthesis and analytical chemistry. Thereafter, I have been employed by Waseda University since October, 2002, during which time I have been engaged, among others, in the research and development in the

field of plant cultivation in an artificial environment. Thus, I am very familiar with the preparation, analysis and properties of various polymer films and plants, or the like.

I understand that the above application has been rejected based on JP-A 55-54825 (KOKAI), and JP-B 7-45169-U (Utility Model, KOKOKU). In order to show the differences between the subject matters of JP-A 55-54825, and JP-B 7-45169-U, and the subject matter of U.S. Patent Application Ser. No. 10/647,076 (hereinafter, referred to as the subject application"), the following experiments were conducted by me.

Experiment 1 deals with a plant growth test using two kinds of films (i.e., a microporous hydrophobic film, and a non-porous hydrophilic film) in an open-air system.

Experiment 2 deals with a plant growth test using a hydrophilicity-imparted microporous hydrophobic film and a PVA film which have been treated with ethanol, in an open-air system.

Experiment 3 deals with a water permeability test using a hydrophilicity-imparted and non-treated microporous hydrophobic films.

Experiment 1

(Comparison between microporous hydrophobic film, and non-porous hydrophilic film)

Each of a microporous polypropylene film (microporous hydrophobic film; trade name: PH-35, mfd. by Tokuyama Corp., having a thickness of about 40 μm), and a non-porous polyvinyl alcohol (PVA) film (non-porous hydrophilic film; mfd. by Aicello Chemical Co., Ltd., having a thickness of about 40 μm) were used as a moisture-permeable film.

Each of these films (size: about 45 cm × 35 cm) was placed in the inside of a basket-shaped plastic container (size: about 30 × 20 × 8 cm) so that the surface of the film was in contact with the inside surface of the basket-shaped container. About 600g of commercially available soil (trade name: Super-Mix A, mfd. by Sakata Seed Co., Ltd.) was poured into the inside of the thus prepared film-covered basket-shaped container. Then, six seedlings which had been grown from pansy seeds (mfd. by Takii & Co., Ltd.) for about 2 months after the sowing of the seeds, were planted on the surface portion of the above-mentioned soil which had been disposed in the film-covered basket-shaped container.

A polystyrene foam container (size: 65 × 90 × 10 cm) covered with a black-colored sheet having a thickness of 0.15 mm was used as water bath for hydroponics, and tap water was poured into the water bath so as to provide a depth of 3 cm (Fig. 1 shows schematic sectoinal view of the water bath used in this experiment). The above-mentioned two kinds of the film-covered basket-shaped container, each of which contained the microporous polypropylene film or the non-porous PVA film, were soaked in the water bath, to thereby cultivate the pansy seedling.

As a result of the cultivation, the above pansy seedlings were smoothly grown for about 2 months without directly supplying additional water to the soil. However, immediately thereafter, only the soil surrounded by the microporous polypropylene film began to be wetted, and after a while, the soil was immersed in water. When the microporous polypropylene film was carefully observed, but there was no holes or cracks such as breakage in the film.

On the other hand, with respect to the PVA film-covered container, the pansy seedlings were smoothly grown for 3 months or more.

In this experiment, the surface of water in the water

bath was in contact with the atmosphere except for the portion thereof in which the film-covered containers were placed. Accordingly, additional water was occasionally supplied to the water bath so as to supplement the loss thereof due to evaporation. After about a few weeks from the beginning of the experiment, the growth of, duckweed was observed in the water bath.

Experiment 2

(Effect of hydrophilicity-imparting treatment of film surface)

(1) Hydrophilicity-imparting treatment

Each of films (size: about 50 cm × 45 cm) of a microporous polypropylene film (microporous hydrophobic film; trade name: PH-35, mfd. by Tokuyama Corp., having a thickness of about 40 μm), and a non-porous polyvinyl alcohol (PVA) film (non-porous hydrophilic film; mfd. by Aicello Chemical Co., Ltd., having a thickness of about 40 μm) were soaked in 200 mL of ethanol (ethanol conc. 76.9 - 81 vol %, mfd. by Nikko Pharmaceutical Co., Ltd.) at room temperature for about one min., and then air-dried at room temperature for about 10 min., to thereby subject the film to a hydrophilicity-imparting treatment.

(2) Cultivation experiment

2L of tap water was added to a waterbath made of polystyrene foam (size: 30 × 20 × 12 cm), and each of the above-mentioned hydrophilicity-imparted film (size: 50 cm × 45 cm) of the microporous hydrophobic film and PVA film was floated on the water. Commercially available soil (trade name: Super-Mix A, mfd. by Sakata Seed Co., Ltd.) was poured onto the film so as to provide a soil thickness of about 2 cm. Twelve rucola seedlings (mfd. by Sakata Seed Co., Ltd.) were planted on the surface portion of the above-mentioned soil which had been disposed on each of the films. After the planting, the water bath were placed in a greenhouse wherein no temperature regulation was conducted.

The states of the plant cultivation are shown in the following photographs of Figs. 2A to 4B attached hereto.

Fig. 2A: Photograph of rucola seedlings at the time of the planting, in the case of microporous hydrophobic film;

Fig. 2B: Photograph of rucola seedlings at the time of the planting, in the case of PVA film;

Fig. 3A: Photograph of rucola seedlings after 5 days from the planting, in the case of microporous hydrophobic

film;

Fig. 3B: Photograph of rucola seedlings after 5 days from the planting, in the case of PVA film;

Fig. 4A: Photograph of rucola seedlings after 16 days from the planting, in the case of microporous hydrophobic film; and

Fig. 4B: Photograph of rucola seedlings after 16 days from the planting, in the case of PVA film.

Microporous hydrophobic film

As shown in Fig. 3A (5 days, microporous hydrophobic film), it was clear that the microporous hydrophobic film had transmitted tap water so that the soil disposed on the film was completely wetted. Further, as shown in Fig. 4A (16 days, microporous hydrophobic film), it was clear that the growth of the seedlings was poor, as compared with Fig. 4B (16 days, PVA film).

PVA film

As shown in Fig. 3B (5 days, PVA film), the PVA was not wetted. Further, as shown in Fig. 4B (16 days, PVA film), the growth of the seedlings was good.

Experiment 3

(Water-permeability test)

There were used a microporous polypropylene film (size: about 20 cm × 20 cm; microporous hydrophobic film, trade name: PH-35, mfd. by Tokuyama Corp., having a thickness of about 40 μm), and the same film which had been imparted with a hydrophilicity by the ethanol treatment in the same manner as in Experiment 2.

Each of the above treated and non-treated microporous polypropylene films was disposed on a mesh colander made of plastic having a diameter of 12.8 cm. Then, the mesh colander was disposed on a plastic bowl having a diameter of 13.4 cm, and a capacity of 650 mL. 150g of tap water was added on the film, the top of the colander was covered with a clear plastic wrap (trade name: Saran Wrap, mfd. by Asahi Kasei Co., Ltd.), and these two combinations of the colander/bowl was left standing at room temperature. After 16 hours, the amount of the water which had been transferred onto the bowl was weighed. The results were as follows:

Non-treated microporous hydrophobic film: 0g

Ethanol-treated microporous hydrophobic film: 9g

I, the undersigned declarant, declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and; further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001, of Title 18, of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 11th day of January , 2004

Akihiro Okamoto

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